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(54) **FILM RECOUVRANT DES PLAQUETTES-SUPPORTS DE PRODUITS POUR EN PERMETTRE UNE
MANIPULATION PLUS SURE**

(54) **FOIL FOR COVERING GOODS CARRIERS SUCH THAT THEY CAN BE HANDLED MORE SECURELY**

(57)

The invention concerns a foil for covering goods carriers such that they can be handled more securely, so replacing the known aluminium cover foils. The foil comprises a plastics matrix which contains a particulate filler, the filler being selected and present in the matrix in such a quantity that the resistance to piercing of the foil is reduced to a limit of less than 450 N/mm (measured on an approximately 150 .mu.m thick foil). A highly crystalline polypropylene is used as the plastics matrix material.



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(54) Title: FOIL FOR COVERING GOODS CARRIERS SUCH THAT THEY CAN BE HANDLED MORE SECURELY

(57) Abrégé/Abstract:

The invention concerns a foil for covering goods carriers such that they can be handled more securely, so replacing the known aluminium cover foils. The foil comprises a plastics matrix which contains a particulate filler, the filler being selected and present in the matrix in such a quantity that the resistance to piercing of the foil is reduced to a limit of less than 450 N/mm (measured on an approximately 150 µm thick foil). A highly crystalline polypropylene is used as the plastics matrix material.

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<p>(54) Title: FOIL FOR COVERING GOODS CARRIERS SUCH THAT THEY CAN BE HANDLED MORE SECURELY</p> <p>(54) Bezeichnung: FOLIE FÜR MANIPULATIONSSICHERE ABDECKUNGEN VON WARENTRÄGERN</p> <p>(57) Abstract</p> <p>The invention concerns a foil for covering goods carriers such that they can be handled more securely, so replacing the known aluminium cover foils. The foil comprises a plastics matrix which contains a particulate filler, the filler being selected and present in the matrix in such a quantity that the resistance to piercing of the foil is reduced to a limit of less than 450 N/mm (measured on an approximately 150 µm thick foil). A highly crystalline polypropylene is used as the plastics matrix material.</p> <p>(57) Zusammenfassung</p> <p>Es wird eine Folie für manipulationssichere Abdeckungen von Warenträgern aus Kunststoff vorgeschlagen, welche die bislang bekannten Aluminium-Abdeckfolien ersetzen kann und welche eine Kunststoffmatrix aufweist, welche einen partikelförmigen Füllstoff enthält, wobei der Füllstoff so ausgewählt und in der Matrix mit einem solchen Anteil enthalten ist, daß die Durchstoßfestigkeit der Folie unter einem Grenzwert von 450 N/mm (gemessen an einer ca. 150 µm dicken Folie) herabgesetzt ist, wobei als Kunststoffmatrix-Material ein hochkristallines Polypropylen verwendet wird.</p>		

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Film for Tamper-Proof Coverings
For Goods Carriers

S P E C I F I C A T I O N

The invention relates to a film comprising a polymer matrix consisting of polypropylene, filled with a particulate filler, in particular for tamper-proof coverings for goods carriers, such as those known, for example, from a plurality of so-called blister packagings.

Such known films for blister coverings have so far consisted of aluminum films, plastic-coated aluminum films up to pure, transparent or opaque plastic films. These films form the counterpart to the goods carrier or the so-called lower part of the packaging which, again, can be formed from a plurality of materials, for example from a stable cardboard layer, a plastic or aluminum tray adapted to the shape of the goods or the like.

The problem so far with using plastic films as blister covering was the fact that pressure-sensitive goods, in particular, could not be pressed through the film and thus removed from the packaging without this leading to damage to the goods, in particular in the case of tablets.

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For this reason, when using films as cover portion for such packagings either one resorted to aluminum films, as is, in particular, the case for the packaging of pharmaceutical products, such as, for example, tablets, ampoules or capsules, or a possibility for removal was, however, provided in the lower part of the packaging.

The object of the present invention is to provide a film for tamper-proof coverings for goods carriers which may be produced from plastics and, nevertheless, displays the known push-through properties of aluminum film coverings and is suitable for a sufficiently speedy sealing procedure.

This object is accomplished in accordance with the invention, in the film described at the outset, in that the film is a push-through film with a puncture resistance, measured on a film 150 μm thick, of less than 450 N/mm and that the polypropylene matrix is formed by a highly crystalline polypropylene.

This limit applies to films approximately 150 μm in thickness. For considerably thinner or thicker films, the corresponding limits can be derived from these values. In the case of the specified limit, it is possible to press goods not sensitive to pressure through the cover film of the goods carrier, even through with some expenditure of force. In the case of more sensitive products, a lower limit will preferably be selected for the puncture resistance, and this value is then preferably at approximately 100 to approximately 200 N/mm. Lower puncture resistances may be recommendable in individual cases where goods very sensitive to pressure are packed. However, it

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should be noted in this respect that with the reduction in the puncture resistance the protective effect of the packaging against damage to the goods themselves is, of course, also decreased and so the numerical range specified above of approximately 100 to approximately 200 N/mm is to be seen as an optimum in many cases.

Thin layers consisting of polypropylene with a filler content of 10 to 60 % by weight of an inorganic filler are known per se from JP-A-61-248793. The purpose described therein relates to an adhesive material which is suitable for forming masks for the production of electronic components or also for spraying motor vehicles. The improved air permeability mentioned in this publication is disadvantageous for numerous applications of the inventive film.

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For the handling of the packaging by the consumer, i.e. in particular when opening the packaging and, therefore, the goods, a further property comes into play secondarily, the so-called resistance to further tearing which determines the force requirements necessary to allow a film which has been penetrated once to be torn further open and thus release the product. This property can also be influenced by the selection of the filler as well as its proportion in the polymer matrix, a resistance to further tearing of less than 30 N (method of measurement according to DIN 53363) being preferably aspired to in this case. This numerical value applies, in particular, for films approximately 150 μm in thickness but can also be used essentially for considerably thinner or thicker films. A value for the resistance to further tearing acceptable for the handling, in particular, of goods sensitive to pressure as well is between approximately 2 and 12 N, whereby it should again be noted that, of course, considerably lower values are possible but any arbitrary reduction is subject to limits with a view to the protection of the goods by the film. A preferred range for the resistance to further tearing is in the range of 3 to 4 N.

The inventive film contains the filler as a homogeneous addition to a plastic material which is already completely polymerized. The filler is not therefore - as known in conjunction with filler-reinforced plastics - dispersed in the polymerization reaction mixture consisting of monomer and/or prepolymer and incorporated into the polymer matrix during the

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hardening of the reaction mixture. However, it is, of course, conceivable to use such reinforced plastic material as polymer matrix in specific applications, also in conjunction with the present invention.

A broad range of fillers is available for the fillers of the film. These can be selected from inorganic and/or from organic substances.

Preferred examples for the organic substances are, e.g., halogenated hydrocarbon polymers, in particular PTFE, polyether sulfones, cellulose fibers, wood pulp or the like, which have, like the PTFE, a melting point of $> 300^{\circ}\text{C}$, as well as duroplastic materials. In the case of the organic substances which are intended to serve as fillers, it is important that these do not liquefy during the processing of the polymer matrix material, during which temperatures of 220°C and more can occur, and then form a homogeneous solution with the polymer matrix material but that these remain essentially in particle form in the polymer matrix during the processing and thus serve to weaken the continuous polymer matrix layer and, therefore, to reduce the puncture resistance and, where applicable, the resistance to further tearing accordingly.

For the inorganic component of the filler, the substance can be selected from the family of silicon dioxides, in particular in the form of glass or quartz, silicates, in particular in the form of talc, titanates, TiO_2 , aluminum oxide, kaolin, calcium carbonates, in particular in the form of chalk, magnesites, MgO , iron oxides, silicon carbides, silicon nitrides, barium sulfate ~~for the like~~.

The form of the filler particles will most often be granular but lamellar, fibrous or rod-shaped filler particles are also possible not only as an essentially unitary form but also in a mixture with other forms as filler particles.

The particle size of the filler (measured over the greatest extension of the particle) is preferably, on average, approximately 5 to approximately 100 μm . The selection of the particle size is, of course, also determined to a not inconsiderable extent by the thickness of the film layer to be produced. Care will thus need to be taken that the average extension of the particles keeps a clear distance in relation to the thickness of the film to be produced. Average particle sizes of between 20 μm and 60 μm , in particular with film thicknesses of 80 μm to 100 μm , are preferred.

In order to ensure that the filler does not lead to a reinforcement of the polymer matrix, care should be taken that the filler particles adhere as little as possible to the polymer matrix. However, the adhesion forces between the particles and the filler matrix should at least be clearly less than the tensile strength of the matrix itself. Care will therefore have to be taken, in particular, in the case of the inorganic filler particles that these are essentially free from so-called coupling or adhesive agents. Such adhesive agents are customarily used for the production of filled plastics, with which the focus is, however, on the particular strength of the material.

On the other hand, the aim is, of course, for the filler particles to be distributed in the polymer matrix as evenly as

possible and for this distribution to also be maintained during the production process and so supplementary agents which improve the dispersibility of the filler particles in the matrix are preferably added.

Particularly suitable as dispersing agents are organic substances which have a low melting point and a large wetting capability for the filler. Concrete examples are low-molecular polyolefin waxes. The dispersing agents are preferably applied to the filler particles before these are mixed, in particular, kneaded with the granulate of the matrix polymer.

The thickness of the film is preferably selected to be from 20 μm to approximately 600 μm which, on the one hand, ensures an adequate stability of the film for protecting the packaged goods and, on the other hand, keeps the forces necessary for opening the packaging within the prescribed limit, within which at least goods insensitive to pressure can still be removed from the packaging by the average buyer without any problem by pushing them through the cover film.

When packaging pharmaceuticals, in particular, it is often desirable for the film to be designed to be essentially impermeable to water and steam.

Highly crystalline polypropylenes, such as those described in EP 0 255 693 B1, having a high isotactic proportion of pentadene of between 0.955 and 1.0 are recommendable as suitable polymer matrix materials. (Method of measurement described in EP 0 255 693 B1).

The average molecular weight of the polymers in the polymer matrix is preferably selected in the range of approximately 10,000 to approximately 600,000.

The module of elasticity (measured in accordance with DIN 53457 on films 50 μm thick) is preferably 1200 - 1400 N/mm^2 for the pure polypropylene to be used. In the case of the filled polypropylene matrix the module of elasticity may increase, for example, to values (in N/mm^2) of 1800 - 2000 with a 5 % by weight filling of talc, 2200 - 2400 with a 10 % by weight filling of talc or 3000 - 3400 with a 20 % by weight filling of talc.

In the films described thus far, solely the addition of the fillers to the polymer matrix brought about an improved puncture resistance or resistance to further tearing.

In the case of larger packaging units, in which a plurality of products are stored separately from one another on a goods carrier and covered by the cover film, it is often desirable for the individual goods to be removable from the goods carrier separately from one another without the packaging of the individual goods located adjacent thereto being damaged.

Depending on the nature of the lower part of the packaging, the normal sealing strength can already be adequate to solve the above-mentioned problem. However, if the sealing strength in a direct contact of the film with the lower part is too low or the sealing times required are too long, it may be necessary to have an additional sealing layer on the film surface.

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However, in order to essentially retain the puncture resistance and the resistance to further tearing predetermined by the original film, it is provided in such goods packagings for the sealing layer to comprise a mixture of a (A) polypropylene copolymer with an ethylene proportion of approximately 4 to 12 mol % and a polymer (B), selected from the family of ethylene vinyl acetate copolymer with a vinyl acetate proportion of up to 18 mol %, ionomers, ethylene ethyl acrylate copolymers, ethylene methacrylate copolymers, polypropylenes and polyethylenes, their copolymers as well as ethylene vinyl acetate copolymers grafted with maleic acid anhydride.

The mixing ratio of the mixture component (A) to the mixture component (B) may be varied within a broad range of 5:95 to 95:5, wherein the temperature behavior of the mixture can be controlled via the component (B) and, in particular, allows a simple adaptation of the sealing layer to suitable sealing temperatures and sealing cycle times.

Optimum sealing temperatures are in the temperature range of 145 to 155°C.

The inventive sealing layer is suitable not only for the push-through films described in the above on the basis of a polypropylene matrix consisting of highly crystalline polypropylene but also, in general, for any type of push-through film which contains the specifications stipulated above for the puncture resistance. In this respect, polymer matrix materials are to be mentioned, in particular, such as polyolefins in general, PVC, polyester, polystyrene or styrene

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copolymerisates which take the place of the highly crystalline polypropylene mentioned at the outset.

Additionally preferred mixing ratios of the mixture components (A) and (B) are at 35:65 to 65:35. Very good sealing results are obtained with mixing ratios of approximately 50:50.

The component (A) is preferably used with an ethylene proportion of 6 - 10 mol %, mostly preferred with a proportion of 8 mol %.

The puncture resistance and resistance to further tearing can be reduced in addition during the production of the film due to a selective increase in the cooling temperature of the cooling roller(s). In this respect, the cooling of the film is preferably carried out on cooling rollers with temperatures of between 20 and 100°C, more preferred between 50 and 80°C. In this respect, the additional reduction in the puncture resistance and resistance to further tearing can be achieved by the use of the calendering process.

The inventive sealing layer material is eminently suitable, in addition, as sealing layer on deep-drawn films, from which the goods carriers or lower parts of the blister packagings are normally manufactured.

It is recommended that the same sealing layer be applied to the push-through film to be combined with the goods carrier so that the sealing layer of the push-through film is bonded to the sealing layer of the deep-drawn film during the sealing process.

In the particularly preferred embodiment of the invention, the film is built up of two or more layers, whereby the two or more layers of the film are preferably produced by being coextruded.

The invention relates, in addition, to a packaging with a lower part as goods carrier adapted where applicable in its shape to the goods to be packed and an upper part consisting of an inventive film already described in the above.

In such a packaging, the lower part and the upper part are preferably produced using the same type of plastic so that a product made of the same type of materials is obtained. Such products made from the same type of materials can be recycled particularly easily and

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reused for the same purpose which represents an optimum packaging cycle.

A particularly preferred use of the inventive packaging consists in the packaging of pharmaceuticals which are present, in particular, in ampoule, capsule or tablet form.

The invention will now be explained in greater detail in the following on the basis of one example:

In a first step, a polymer granulate is mixed with the filler amounts and subsequently extruded or calendered. The mixing, in particular the homogenization, can take place by means of kneading in accordance with known processes, in particular twin-screw compounding. The individual components can, however, also be mixed with one another in a dry mixing process. A better homogeneity, i.e. a more even distribution of the fillers in the polymer matrix, is achieved by means of the preceding production of a so-called compound.

Treatment of the filler particles with dispersing agents should take place, in any case, prior to the blending with the matrix polymer.

The compound is melted in the extruder, namely at melt temperatures of approximately 220°C and more as well as at a melt pressure of up to 250 bar. The melt is preferably cooled over a chill roll at 20°C to approximately 40°C but other cooling processes, where necessary with a surface treatment combined with a corona discharge, are also possible.

The films are then cut and wound.

A highly crystalline polypropylene having a melt-flow index of approximately 8 g/10 min in accordance with DIN 53735 (230°C/2.16 kg) and a density (23°C) in accordance with DIN 53479 of 0.902 g/cm³ may be mentioned as an example. Types of polypropylene differing from this can, of course, also be used.

Chalk or talc is suggested as filler for this example with an average particle size of 5 to 60 µm, better still with an average particle size of 20 to 30 µm. The proportion of fillers in the overall film weight is preferably from 10 to 55 % by weight. Below a filler proportion of 5 % by weight, an adequate embrittlement of the polymer with the reduction in the puncture resistance and the resistance to further tearing connected thereto is normally no longer attained. With proportions clearly above 60 % by weight, the production of the film is difficult and the physical resistance values are often no longer adequate for the typical uses.

As is customary in the production of propylene films, a rewinding is also carried out with the inventive film on a polypropylene basis for reasons of postcrystallization. (The duration of the postcrystallization is typically 4 to 10 days).

With a mixture of

95 % by weight of polypropylene, highly crystalline, of the Mitsui company with the product identification name CJ700,

and

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5 % by weight of talc as filler, average particle size
20 μm , a film 150 μm thick was produced
(density 0.93 g/cm^3).

A puncture resistance of 360 N/mm and a damage energy in
accordance with DIN 53373 of 0.5 J/mm could be measured on this
film.

From a mixture of

90 % by weight of polypropylene, highly crystalline, of
the Mitsui company with the product identification
name CJ700,

and

10 % by weight of talc as filler, average particle size
20 μm , a film 150 μm thick was produced
(density 0.965 g/cm^3).

A puncture resistance of 220 N/mm and a damage energy of
0.2 J/mm could be measured on this film.

If the mixture is adjusted to 80 % by weight of polypropylene
(specification see above) and 20 % by weight of talc
(specification see above), a puncture resistance of
approximately 100 N/mm as well as a damage energy of 0.05 J/mm
are obtained. The density of the material was determined at
1.04 g/cm^3 .

In accordance with another aspect of the invention, the film as described herein may have two or more layers. Advantageously the two or more layers may be coextruded. In some cases the external layer of the film may be a sealing layer.

In accordance with another aspect of the invention an advantageous blister pack can be created, the blister pack having a lower part which may be shaped as applicable to accommodate the shape of the goods to be packaged, the blister pack also having an upper part made from a film as described herein. In an advantageous embodiment both the upper part and the lower part of the blister pack may be made of the same material. The lower part may be produced from a deep drawn film which has a sealing layer as described herein.

Patent Claims:

1. A film for tamper proof coverings for goods carriers comprising a polypropylene matrix containing a particulate filler, and wherein the film is a push-through film with a puncture resistance, measured on a film 150 μm thick, of less than 450 N/mm and the polypropylene matrix is formed by a highly crystalline polypropylene.
2. Film as defined in claim 1, characterized in that the filler is chosen and the proportion of the filler selected such that the resistance to further tearing is reduced to below a limit of 30 N.
3. Film as defined in claim 1 or 2, characterized in that the value of the puncture resistance is 100 to 200 N/mm.
4. Film as defined in claim 2, characterized in that the value of the resistance to further tearing is 3 to 4 N.
5. Film as defined in any one of claims 1 to 4, characterized in that the filler comprises a component of organic and/or inorganic substance.
6. Film as defined in claim 5, characterized in that the filler comprises an organic substance selected from the group of halogenated hydrocarbon polymers, PTFE, polyether sulfones, cellulose fibers, wood pulp and/or duroplastic materials.
7. Film as defined in claim 5 or 6, characterized in that the filler comprises an inorganic component and the inorganic component contains a substance selected from the family of SiO_2 , glass, quartz, silicates, talc, titanates, TiO_2 , aluminum oxide, kaolin, calcium carbonates, chalk, magnesites, MgO , iron oxides, silicon carbides, silicon nitrides, and barium sulfate.

8. Film as defined in any one of claims 1 to 7, characterized in that the filler is granular, lamellar, fibrous or rod-shaped.
9. Film as defined in any one of claims 1 to 8, characterized in that the particle size of the filler, measured over the greatest extension of the particle, is on average 5 μm to 100 μm .
10. Film as defined in any one of claims 1 to 9, characterized in that the filler content is from 5% by weight to 60% by weight.
11. Film as defined in any one of claims 1 to 10, characterized in that the filler particles are essentially free from adhesive agents.
12. Film as defined in any one of claims 1 to 11, characterized in that the filler particles are pretreated with a supplementary agent for improving the dispersibility of the filler particles in the matrix.
13. Film as defined in any one of claims 1 to 12, characterized in that its thickness is 20 μm to 600 μm .
14. Film as defined in any one of claims 1 to 13, characterized in that it is essentially impermeable to steam.
15. Film as defined in any one of claims 1 to 14, characterized in that the polypropylene of the polypropylene matrix has a high isotactic pentadene proportion.
16. Film as defined in claim 15, characterized in that the isotactic pentadene proportion is between 0.955 and 1.0.
17. Film as defined in any one of claims 1 to 16, characterized in that the polypropylene of the polypropylene matrix has an average molecular weight of 10,000 to 600,000.

18. Film as defined in any one of claims 1 to 17, characterized in that it has two or more layers.
19. Film as defined in claim 18, characterized in that the two or more layers of the film are coextruded.
20. Film as defined in either of claims 18 or 19, characterized in that an external layer is a sealing layer.
21. Film as defined in claim 20, characterized in that the sealing layer is formed of a material comprising a mixture of two polymer components, wherein the first component (A) consists of a polypropylene copolymer with an ethylene proportion of from 4 to 12 mol % and wherein the second component (B) is selected from the family of

ethylene vinyl acetate copolymer with a vinyl acetate proportion of up to 18 mol %,
ionomers,
ethylene ethyl acrylate copolymers,
ethylene methyl acrylate copolymers,
polypropylenes, polyethylenes and ethylene vinyl acetate copolymers grafted with maleic acid anhydride.
22. Film as defined in claim 21, characterized in that the mixing ratio of the components (A) and (B) is 5:95 to 95:5.
23. Film as defined in claim 22, characterized in that the mixing ratio of the components (A) and (B) is 35:65 to 65:35.
24. Film as defined in claim 21, characterized in that the mixing ratio of the components (A) and (B) is adjusted such that a sealing temperature in the range of 145 to 155°C is obtained.

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25. Film as defined in any one of claims 21 to 24, characterized in that the ethylene proportion of the component (A) is 6 to 10 mol %.

26. Film as defined in claim 2, characterized in that
5 the puncture resistance and resistance to further tearing can be reduced in addition due to a selective increase in the cooling temperature of cooling roller(s).

27. Film as defined in claims 26, characterized in that the cooling of the
10 film on the cooling rollers is between 20 and 100° C.

28. Film as defined in claim 2, in which an additional
reduction in the puncture resistance and resistance to further tearing is
achieved by the use of a calendaring process.

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29. A blister packaging comprising a lower part as goods carrier adapted
where applicable in its shape to the goods to be packed and an upper part
consisting of a film as defined in any one of claims 1 to 28.

20 30. A blister packaging as defined in claim 29, characterized in that the lower part and the upper part are produced using the same plastic material.

31. A blister packaging as defined in claim 29 or 30, characterized in that
the lower part is produced from a deep-drawn film having a sealing layer in
25 accordance with any one of claims 21 to 25.

32. Use of the packaging as defined in any one of claims 29 to 31 for
packing pharmaceuticals in ampoule, capsule or tablet form.

30 33. A layered film for tamper-proof coverings for goods carriers having at least two layers, comprising a first layer comprising a polymer matrix containing a particulate filler, wherein the filler is present in an amount of from

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10% by weight to 60% by weight, wherein the polymer matrix is formed by a highly crystalline polypropylene having an isotactic pentadene proportion of from 0.955 to 1.0 and an external layer in the form of a sealing layer, said sealing layer is formed of a material comprising a mixture of two polymer
5 components, wherein the first component (A) consists of a polypropylene copolymer with an ethylene proportion of from 4 to 12 mol % and wherein the second component (B) is selected from the family of

ethylene vinyl acetate copolymer with a vinyl acetate proportion of up to 18
10 mol %,
ionomers,
ethylene ethyl acrylate copolymers,
ethylene methyl acrylate copolymers,
polypropylenes, polyethylenes and ethylene vinyl acetate
15 copolymers grafted with maleic acid anhydride,

the puncture resistance of the film being less than 450 N/mm measured on a film 150 μ m thick.

20 34. Film as defined in claim 33, characterized in that the filler is chosen and the proportion of the filler selected such that the resistance to further tearing is reduced to below a limit of 30 N.

35. Film as defined in claim 33 or 34, characterized in that the value of the
25 puncture resistance is from 100 to 200 N/mm.

36. Film as defined in claim 34, characterized in that the value of the resistance to further tearing is from 3 to 4 N.

30 37. Film as defined in any one of claims 33 to 36, characterized in that the filler comprises an inorganic and/or organic substance.

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38. Film as defined in claim 37, characterized in that the filler comprises an organic substance selected from the group consisting of halogenated hydrocarbon polymers, PTFE, polyether sulfones, cellulose fibers, wood pulp and duroplastic materials.

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39. Film as defined in claim 37 or 38, characterized in that the inorganic component contains a substance selected from the family consisting of SiO_2 , glass, quartz, silicates, talc, titanates, TiO_2 , aluminum oxide, kaolin, calcium carbonates, chalk, magnesites, MgO , iron oxides, silicon carbides, silicon
10 nitrides and barium sulfate.

40. Film as defined in any one of claims 33 to 39, characterized in that the filler is granular, lamellar, fibrous or rod-shaped.

15 41. Film as defined in any one of claims 33 to 40, characterized in that the particle size of the filler (measured over the greatest extension of the particle) is on average from 5 μm to 100 μm .

20 42. Film as defined in any one of claims 33 to 41, characterized in that the filler content is from 10 % by weight to 55 % by weight.

43. Film as defined in any one of claims 33 to 42, characterized in that the filler particles are essentially free from adhesive agents.

25 44. Film as defined in any one of claims 33 to 43, characterized in that the filler particles are pretreated with a supplementary agent for improving the dispersibility of the filler particles in the matrix.

30 45. Film as defined in any one of claims 33 to 44, characterized in that its thickness is from 20 μm to 600 μm .

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46. Film as defined in any one of claims 33 to 45, characterized in that it is essentially impermeable to steam.

47. Film as defined in any one of claims 33 to 46, characterized in that the polypropylene of the polymer matrix has an average molecular weight of from 10,000 to 600,000.

48. Film as defined in any one of claims 33 to 47, characterized in that the two or more layers of the film are co-extruded.

10

49. Film as defined in any one of claims 33 to 38, characterized in that in the sealing layer the mixing ratio of the components (A) and (B) is 5:95 to 95:5.

50. Film as defined in claim 49, characterized in that the mixing ratio of the components (A) and (B) is 35:65 to 65:35.

51. Film as defined in claim 33, characterized in that the mixing ratio of the components (A) and (B) is adjusted such that a sealing temperature in the range of 145 to 155°C is obtained.

20

52. Film as defined in any one of claims 33 to 51 characterized in that the ethylene proportion of the component (A) is 6 to 10 mol %.

53. Film as defined in one of claims 33 to 52 characterized in that the ethylene proportion of the component (A) is 8 mol %.

25

54. Film as defined in claim 34, characterized in that the puncture resistance and resistance to further tearing can be reduced in addition due to a selective increase in the cooling temperature of the cooling roller(s).

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55. Film as defined in claim 54, characterized in that the cooling of the film on the cooling rollers is between 20 and 100°C.

56. Film as defined in claim 54, characterized in that the cooling of the film
5 on the cooling rollers is between 50 and 80°C.

57. Film as defined in claim 34, characterized in that an
additional reduction in the puncture resistance and resistance to further
tearing is achieved by the use of the calendaring process.

10

58. A blister packaging with a lower part as goods carrier adapted where
applicable in its shape to the goods to be packed and an upper part consisting
of a film as defined in any one of claims 33 to 57.

15 59. A blister packaging as defined in claim 58, characterized in that the
lower part and the upper part are produced using the same plastic material.

60. A blister packaging as defined in claims 58 or 59, characterized in that
the lower part is produced from a deep-drawn film having a sealing layer
20 according to the definition of any one of claims 49 to 52.

61. Use of the blister packaging as defined in any one of claims 58 to 60,
for packing pharmaceuticals in ampoule, capsule or tablet form.